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Prognosis of Tuberculosis in Infancy.—Lemaire has observed 100 patients less than two and a half years of age, in whom the clinical diagnosis has been corroborated by positive skin tests. Twenty-four of them have died. The prognosis depends principally on the following: (1) Age at time of infection, infection during the early months being most commonly fatal; (2) mode of infection, family infection being more uniformly fatal than accidental infection; (3) time of separation from tuberculous parents, earlier separation producing, of course, lower mortality; (4) general prophylactic measures; (5) clinical type of the patient's disease; and (6) method of feeding (in this series the mortality was not appreciably different in the bottle and breast-fed babies).—*Les éléments du pronostic de la tuberculose du premier age d'après cent observations, H. Lemaire, Nourrisson, January, 1925, xiii, 44.*—*(P. J. W.)*

Leucocytes in Tuberculosis of Children.—Bronchial lymph-node tuberculosis and phthisis in infancy and childhood cause no characteristic change in the total leucocyte count. Likewise, in bronchial node tuberculosis the ratio between the polynuclear neutrophiles and lymphocytes shows no typical changes. In phthisis, on the other hand, a definite shifting of the neutrophiles and lymphocytes in favor of the neutrophiles is evident. The percentage of eosinophiles appears in phthisis, in distinction to bronchial node tuberculosis, to suffer a diminution.—*Über die Verwertbarkeit des weissen Blutbildes bei der Bronchialdrüsen- und Lungentuberkulose in Säuglings- und Kindesalter, F. Mündel, Beitr. z. Klin. d. Tuberk., 1924, lviii, 293.*—*(H. J. C.)*

Lipolytic Activity of Blood Serum in Tuberculosis of Children.—By lipolytic activity of the serum is meant its power to convert neutral fat into fatty acids and glycerol. Quotations from the literature are given which indicate that the lipase activity is a good index of the patient's condition. The lipolytic activity of the serum is given in terms of the number of minutes required by 0.5 cc. of the serum to change the surface tension of 30 cc. of a fully saturated to a half-saturated tributyrin solution, the reaction taking place at the optimum pH for blood lipase activity, which is 8.3. The normal figure is 25 to 35 minutes. The shorter the time required, the greater is the fat-splitting power of the serum. In the 16 control patients, lipolytic activity ranged between 24 and 35 minutes. In all the 14 cases of inactive or healed tuberculosis, the lipolytic power was normal except in a patient with hilum-node enlargement and an old calcified lesion at the left base. Of the 39 clinically active cases of tuberculosis, 26, or 67 per cent, had very low lipolytic activity, that is, below 50 minutes. The lower values (one was 225 minutes) were obtained in patients with caseation and cavitation. Nine of these 39 patients had a normal lipolytic activity. Four of these 9 had lymphadenitis or keratitis, 2 were included because they had positive Pirquet tests under 2 years of age. The authors conclude that there are undoubtedly occasions when the knowledge of the lipolytic power of the serum may be of considerable aid in the diagnosis.—*Lipolytic Activity of the Blood Serum in Tuberculosis, E. T. Wilkes, Am. J. Dis. Child., June, 1925, xxix, 773.*—*(P. J. W.)*

Prophylaxis of Tuberculosis in Infancy and Childhood.—Calmette and Behring have especially drawn attention to the importance of early infection in the later manifestation of tuberculosis and in the control of the disease. Following the

initial penetration of the tubercle bacillus into the body there are three possibilities: (1) steady progression and invasion leading to death; (2) the appearance, at longer or shorter intervals, of localizations which undergo evolution and arrest; or, (3) the production of merely latent or hidden pathological changes which, however, may at some future time become a menace. Such reactivation is probably the commonest cause of adult tuberculosis, although the possibility of a new infection is admitted. Inheritance of the tubercle bacillus is so rare as to be practically negligible. Inheritance of the "soil," or constitution, is more debatable. The mean weight at birth of the children of tuberculous parents has been found to be as great as when the parents were not tuberculous, only those parents with far-advanced disease having underweight children. Development also occurs normally, and 62 per cent of the children show a normal gain in weight. Malformations are rare, occurring in only about 1 per cent. The term "hereditary predisposition," apart from other physical characteristics, is rather vague, and its distinction from early exposures to infection has not been clearly shown. The only real authenticated difference in these children of the tuberculous is that a somewhat larger proportion than usual die prematurely in the first or second month of life, without any obvious clinical or anatomical lesions. It is known that infection ordinarily occurs before the age of 15 years, the proportion increasing progressively up to that time; also that it is almost always from human sources. The young infant, however, is ordinarily protected from such infection by the circumstances of his existence. When he is infected, the mother is responsible in 77 per cent of cases. A tuberculous person, or the close proximity of one (only open tuberculosis is here considered), may be regarded as a fertile source of contagion, in contradistinction to those scattered or dispersed sources met with in the ordinary course of existence and which can scarcely be avoided. Contact with such a source is likely to mean a massive or prolonged infection. This prolongation of the contact is very important, there being undoubtedly a cumulative effect. It may be said that the consequences of the infection are a function of the number of bacilli introduced, proportionate to the size of the body infected. The modified reactions due to a previous infection must also be considered. The practical problem is, then, to prevent contamination of the young by "rich" sources of infection, which threaten an acute evolutive tuberculosis. The "poor" sources can practically be disregarded, as they do not menace infants or provoke dangerous forms of tuberculosis because of their scarcity of bacilli; in fact, they may even exert an immunizing effect. It is especially in the first two years of life that exposure of the child to all known sources of infection must be avoided, as even the slightest contamination, sufficiently repeated, may be dangerous. Hence the separation of the child from its family becomes essential. This is the principle of the *Oeuvre Grancher*. Its function is not limited, however, to only the uninfected child. The *Oeuvre Grancher* seeks out children between the ages of 3 and 13, the issue of tuberculous and healthy parents, and places them in healthy peasant families selected by physicians, who continue to exercise their supervision. This method avoids such disadvantages of institutional treatment as epidemics of infectious diseases, and provides a normal home atmosphere. As it grows up the child works in the fields and develops a taste for country life, so that the Oeuvre Grancher may be said to bring people back to the soil. Also, familial placement is less costly than institutional care. The results of the work have recently been published by Armand-Delille, its Secretary-General. During a space of twenty years 2,500 children have been so placed, and among these have developed 7 cases of tuberculosis, of which 2 were fatal and 5 recovered; another 3 cases developed long after leaving the tutelage of the Oeuvre, and 2 children died from other causes. These results speak for themselves; in contrast, the tuberculosis morbidity in children in contact with tuberculous parents is 60 per cent and the mortality 40 per cent. Recently the work has been extended so as to include children under 3 years, not provided for by the Oeuvre Grancher. There have been established supervised family placement centres, comprising peasant families up to the number of about 50, with a dispensary, a small infirmary, a dairy kitchen and nurses. The children placed among these families are brought periodically for examination, consultation and advice, a physician being attached to each centre. Antenatal prophylaxis receives attention, thanks to connections established with the Hospital Laennec and several maternity hospitals. Postnatal prophylaxis deals with children known to have been in contact for a variable length of time with a tuberculous parent. Cutaneous tuberculin tests are carried out at intervals, in order not to overlook an infection in the ante-allergic phase, the children meanwhile being kept under observation. The longer the ante-allergic period, the less severe the infection.

In cases shown to be infected, the age of the child, the duration and intimacy of contact, the length of time since separation, are all considered before a child is accepted for placement. During the period of observation the child is kept in a special *crèche*, provisions being made for either artificial feeding, wet-nursing, or maternal nursing with precautions (mask and blouse). Between April, 1920, and December, 1923, this *Oeuvre du Placement familial des Tout-Petit* placed 298 infants among its centres, of whom only 9 have died, a mortality of about 3 per cent. About an equal number have died within two months after leaving the centres. Most of these children, when placed, were under one year of age, and in a considerable number tuberculous infection had already occurred. It must be remembered that even among children separated from healthy parents the average mortality in France is about 50 per cent. The objections to the carefully supervised placement system will not withstand examination. Criticisms based on moral and sentimental grounds must yield to the vital necessity of the separation from the family, when it is realized that, otherwise, 75 per cent of these children will become seriously infected and 80 to 95 per cent of them will die. The real difficulties are the necessity of finding country people who are clean, disciplined, and with the proper tradition and training to care for children, and a locality accessible to educational facilities, yet agricultural rather than industrial, and with an adequate milk supply. The recruiting of suitable nurses is also not an easy matter. Preventoria, or institutions for collective placement, should be reserved for children of all ages affected with mild or curable forms of tuberculosis, or those who are debilitated and undernourished or exposed for some time to family contagion. They should be equipped with special hygienic facilities, where rest, aeration, supervised alimentation, instruction and physical training may be carried out. In France there are about 5,000 preventorium beds; in the Department of the Seine, 1,205. The antituberculosis dispensary is the axis of the entire social service, together with medical school inspection and maternity examination. When, for any reason, separation of the child from its tuberculous environment is not possible, the dispensary must assume the task of domiciliary prophylaxis. In exceptional cases this may be satisfactorily carried out. The remaining prophylactic method, that of specific vaccination, is still in the experimental stage, but Calmette's work with his attenuated "biliated" tubercle bacilli offers much promise.—*La prophylaxie de la tuberculose chez l'enfant, L. Bernard, Conférence internationale contre la tuberculose, Lausanne, August 5–7, 1924, reported in Rev. d. l. Tuberc., December, 1924, v, 770.*—(*A. P.*)

Vaccination of Newborn against Tuberculosis.—It is known how fruitless have been previous attempts at immunization, either active or passive, to tuberculous infection, and how many methods and forms of vaccines have been tried. Therefore, special interest attaches to the work carried on for some years by Calmette and Guérin with tubercle bacilli attenuated by numerous transplants on biliated media. This new and innocuous form of bacillus (*B. C. G.*) is a true tubercle bacillus, and has no relation to the so called "paratubercle bacilli." It continues to secrete active tuberculin and to induce the formation of antibodies demonstrable by the Bordet-Gengou reaction. Also, when introduced into the body in suitable doses, it confers a manifest resistance to infection with virulent bacilli. Since 1921, in the agricultural experiment stations of the Seine Inférieure and Seine-et-Oise, Calmette and Guérin have carried on successful experiments with young cattle. Also, at Dakar and Kendia, in French Guinea, and at the Pasteur Institute, equally good results have been obtained on anthropoid apes. These results led to attempts at immunization of the newborn in 1922 in the maternity service of La Charite, and was followed in turn by a series of prophylactic vaccinations of infants in the sixth arrondissement of Paris. An emulsion of *B. C. G.* prepared by the Institute was then furnished to physicians at Liége and other Belgian cities for administration by ingestion. The results of the series thus far published by Calmette show 217 infants vaccinated, of whom 178 were followed up, and of these 9 died; in none of these was the cause of death known to be tuberculosis. The development of the infants was normal. The total vaccinating dose of *B. C. G.* is about 1,200 million bacilli. It should only be given to the newborn before they are exposed to any source of infection.—*La vaccination anti-tuberculeux des novu aux-nés, J. Van Beneden, Rev. Belge d. l. Tuberc., January, 1925, no. 1, 19.*—(*A. P.*)

Additional Note: The Institut d'Hygiene at Hainaut has organized a service for preparation and distribution of *B. C. G.* vaccine. There is a similar service, inaugurated by Malvoz and Fabry, at the Provincial Institute of Bacteriology at Liége. The vaccine is put out in ampules which will keep for ten days and only the expense of mail or express is charged.—(*A. P.*)

Immunity and Prophylaxis in Tuberculosis in Children.—The following facts are emphasized: *1:* The bovine as well as the human tubercle bacillus is pathogenic for man. *2:* Inhalation of bacilli from tuberculous patients is the most frequent mode of infection. *3:* The primary focus is usually in the lung. *4:* The source of the bovine bacillus in milk, cream, and butter, is usually from infected dung; the swallowed bacilli come from ulcerated lesions in the cow's lung, rather than from tuberculous udder disease. *5:* Rest, light, air, and a carbohydrate diet are our chief therapeutic aids. The following facts about tuberculous immunity are summarized: *1:* If the second infection of tubercle bacilli is made too soon after the first the second infection acts like a primary one. *2:* When the second infection is delayed several months, instead of several weeks, after the primary, only a slight transient swelling occurs at the site of the second injection. Individuals who recover from the primary infection can usually resist relatively large subsequent doses without symptoms of tuberculous disease. Prophylaxis against the bovine bacillus must be thorough, as this source is easily preventable. Prompt isolation of newly born babies from any tuberculous environment is also of obvious importance. Calmette advises artificial immunization by means of a living culture of an avirulent bovine strain (*B. C. G.*).—*Immunity and Prophylaxis in Tuberculosis, L. W. Sauer, Arch. Pediat., February 1925, xlii, 73.*—(*P. J. W.*)

Artificial Pneumothorax in Infant.—A girl of thirteen and a half years, discovered to have advancing tuberculosis in May, 1923, showed gain in weight and improvement in her general condition after the fresh-air and rest cure, but in March, 1924, the process was still active and a cavity had appeared in the left lung. Artificial pneumothorax was then given, in spite of a few signs of infiltration at the right apex. The results were good, the temperature dropping and remaining between 36.5° and 37.5°C. and the patient gaining 7 kg. in weight. The volume of each insufflation did not exceed 200 cc. to avoid the production of pleural effusion.—*Tuberculose infantile traitée par le pneumothorax artificiel, Gardère and Lacroix, Meeting, Soc. Médicale des Hôpitaux de Lyon, March 17, 1925, no. 27, 440.*—(*E. H. K.*)

Treatment of Joint Tuberculosis in Children.—The treatment of tuberculous joints in children has in general been most discouraging. The remarkably successful results of Rollier in Switzerland and groups of surgeons in France, England and America certainly speak in favor of the so called outdoor treatment. Rest, open air and good food are the cardinal factors of treatment. Rest should be enforced, uninterrupted and prolonged, as both Thomas and Hilton taught. Rest is desirable as long as the febrile stage continues, just as in pulmonary tuberculosis. Rest in bed must be continued, with proper splinting and traction as long as the spastic condition about the joint remains. Enforced rest never produces true ankylosis. Wind is a valuable ally in outdoor treatment. How it exerts its beneficial effects is not definitely known. Rollier considers it a cooling agent to the sun's rays and a tonic to the general constitution. Sufficient attention has not been given to the skin. There is evidence to support the view that the skin exerts a very high resisting power against the tubercle bacilli. *Conclusions:* 1. Conservative measures should be used in the treatment of tuberculous joints in children. 2. The restoration of function, rather than ankylosis, should be the aim in the great majority of these cases. 3. Open-air hospitals for the treatment of tuberculous joints in children should be more generally established, preferably in the mountains or at the seashore.—*Treatment of Tuberculous Joints in Children, P. C. Colonna, Med. J. and Rec., August 5, 1925, cxxii, 155.*—(*B. T. McM.*)

Unusual Case of Tuberculous Meningitis in Child.—A girl of five had had an acute illness, with mostly upper respiratory symptoms, for 12 days. Examination showed anemia, palpable spleen and liver, moderate weakness of all the extremities, with pronounced paresis of the right arm and leg. Three days after admission there was complete flaccid paralysis of the right upper extremity. Babinski positive on the right. One week after admission, the left lung had impaired resonance and scattered fine râles. X-ray showed mottling throughout both lungs, most marked in the left. The child grew more and more drowsy. Thirteen days after admission tubercles were found in the choroid of each eye. The child died on the nineteenth day after admission, having developed typical signs of tuberculous meningitis. The spinal fluid on admission was normal. The Pirquet test was negative, and the intracutaneous strongly positive. The spinal fluid six days after admission contained 170 cells, with 95 per cent mononuclears. The day before death the spinal fluid was found to contain myriads of tubercle bacilli.—*An*

Unusual Case of Tuberculous Meningitis, W. H. McCaslan, Arch. Pediat., April, 1925, xlii, 265.—(P. J. W.)

Solitary Cerebellar Tuberculoma in Infant.—The patient was a colored baby girl aged 13 months. Symptoms consisted of constipation, fever, convulsions, irritability, cerebral cry, marked enlargement of the head, bilateral internal strabismus, bulging fontanel, rigid neck, spastic paraplegia, and general adenopathy. The spinal fluid was clear and under moderate pressure, the cell count normal, and globulin increased. There were no tubercle bacilli. At autopsy, the right cerebellar lobe contained a caseous nodule the size of a hazelnut. There was caseous tuberculosis of the bronchial lymph nodes and small intestine. The author briefly reviews the literature of this subject.—*A Case of Solitary Cerebellar Tuberculoma, M. Gleich, Arch. Pediat., April, 1925, xlii, 273.—(P. J. W.)*

Nontuberculous Spontaneous Pneumothorax in Infant.—An infant of fifteen months developed a total, spontaneous right-sided pneumothorax during a convulsion three months after pneumonia of the right apex. The rupture of an alveolus, emphysematous from the pneumonia, is thought to have been the cause. Symptoms and signs were similar to those of an adult case. The course was uncomplicated, and successive X-rays showed the complete absorption of the air in three and one-half months.—*Un cas de pneumothorax Spontané non tuberculeux chez un nourrison, Lereboullet, Cathala and Lelong, Meeting, Soc. de Péd., January 20, 1925, reported in Presse Méd., February 14, 1925, no. 10, 151.—(E. H. K.)*

Factors in Prognosis of Tuberculosis in Infants.—Since the employment of the tuberculin cutireaction for diagnostic purposes, the morbidity has increased by the addition of many curable cases and the mortality has relatively fallen. There is, however, no agreement in the figures for the latter, which range, according to the source, from 85 to 31 per cent. In this study the records were gathered from the consulting service of the School of Puericulture, of the Paris Faculty of Medicine and of the Hôpital Trousseau, and concern children up to two and a half years of age. The cutireaction was performed, not only in all cases with symptoms or signs referable to the respiratory apparatus, but also when there was an arrest in the weight or development curve, an unexplained febrile state, prolonged digestive troubles, anorexia, bone, skin, or articular lesions, or evidence of meningeal irritation. There were altogether 100 cases, which were followed for from three months to over two years. Among those followed but a short time most of the deaths occurred. Altogether there was a mortality of 24 per cent. In those infected prior to one year of age the mortality was 57 per cent, as compared with 1.7 per cent for the older children. Of the 100 children 82 per cent were obviously infected by other members of the family, and this was the case among all but one (95 per cent) of those who died, as compared with 77.6 per cent of those who survived. These figures show that early family contagion much more commonly results fatally, while accidental (outside) contagion rarely plays much of a rôle in young infants. Among 67 children separated from their parents there were only 3 deaths (4.5 per cent), while among 33 not separated there were 21 deaths (63.6 per cent). The 3 cases of the former in which death ensued were separated only quite late, and two already had generalized disease. The tuberculous infants observed at the Ecole de puériculture belonged to families under surveillance by the nurses of the Office d'Hygiène Publique Sociale, who made it their business to try to get the tuberculous parent to the dispensary and to apply domestic prophylactic measures. In spite of this, among 18 families under such dispensary surveillance a larger proportion of children were lost than among 64 other families who adopted no prophylactic measures at all. The results show that home prophylaxis is not effective, and this can be well understood when one goes into their homes and sees the conditions under which they exist. Therefore, the dispensary should concern itself with trying to remove the child from his contagious surroundings. The clinical form of the disease affects the prognosis. Tuberculosis of the peripheral lymph nodes and skin is relatively benign, while miliary or "gangliopulmonary" tuberculosis in early childhood is grave. Fifty per cent of the fatal cases showed the gangliopulmonary form, 33 per cent tracheobronchial adenopathy, and 4 cases an acute tuberculosis in which anemia and impaired nutrition were the only prominent symptoms. Among those surviving there were also 9 cases in which anemia seemed to be the only symptom, but the X-ray showed tracheobronchial adenopathy. Splenomegaly occurred twice as frequently among

those that died as among those that survived. The method of feeding did not seem to be a factor.—*Les éléments du prognostic de la tuberculose du premier âge d'après cent observations, H. Lemaire, Meeting, Section de études scientifiques de l'Oeuvre de la Tuberculose, December 13, 1924, reported in Rev. d. l. Tuberc., March, 1925, vi, 228.*—(*A. P.*)

Chickens and Pigeons Resistant to Human and Bovine Tubercle Bacilli.—Human sputum, rich in tubercle bacilli, was fed to two young chickens for 23 and 25 days; to a third for over 65 days; and to 2 pigeons for 60 days. No tuberculous changes were found in the animals upon section. Two other chickens received daily 60 cc., for 47 and 57 days, material rich in tubercle bacilli from bovine sources. The same bovine material was given to a rooster, 100 cc. daily for 61 days; and to two pigeons, 30 cc. daily for 56 days. None showed any tuberculous changes. It was not possible, therefore, by feeding large amounts of tubercle bacilli in human sputum or bovine material, to produce tuberculosis in chickens or pigeons. On the other hand, a pigeon and a chicken injected subcutaneously or fed 20 mgm. of avian tubercle bacilli developed tuberculous changes. Pigeons proved more resistant to this type than chickens.—*Fütterungsversuche mit vom Menschen und vom Rinde stammendem tuberkulösen Material an Hühnern und Tauben, K. Zschernitz, Dissertation, Leipzig, 1923, Abst. from Centralbl. f. d. ges. Tuberk.-Forsch., 1924, xxii, 344.*—(*H. J. C.*)

Tuberculin Test for Avian Tuberculosis.—Fowls may be readily tested by injecting tuberculin into the wattle on one side, the other wattle constituting a control. Readings should be made at twenty-four and forty-eight hours, the latter being the more important. A large number of several flocks under observation were tested and found to have positive reactions. Of one flock comprising 467 birds, 38 per cent reacted, and of these 80 per cent showed lesions at autopsy. Fifty-one of the non-reactors were very thin and were removed as culls and killed. One-half of these were found at autopsy to have tuberculosis. An alcohol precipitate of O. T., avian, was found, when dissolved in physiological saline solution, to be the most potent type of tuberculin for the purpose under consideration. Of 13 farm flocks, with 2,540 chickens, 747, or 31 per cent, reacted; the reactors were killed, and in about 90 per cent tuberculosis was found. Subsequent tests at intervals revealed a marked decline in the incidence of positive reactors. Avian tuberculosis is a serious disease and may cause great economic loss. Its eradication, although requiring much persistent effort, can be accomplished by removing all reactors, and this with flocks in the same pens as before testing began.—*The Tuberculin Test in Avian Tuberculosis, E. L. Stubbs, J. Am. Vet. Med. Assn., May, 1925, lxvii (n. s. xx), 239.*—(*H. S. W.*)

Ophthalmic Tests on Cattle.—Extracts were prepared by grinding, in a ball-mill, tubercle bacilli treated with 0.8 per cent sodium chloride solution, 0.5 per cent hydrochloric acid, 0.8 per cent sodium carbonate and 0.55 per cent sodium hydroxide. The proportion of tubercle bacilli to the solution was 20 mgm. to 1 cc. Dry grinding was continued for 24 hours, after which the fluid was added gradually drop by drop. After a further grinding in the ball-mill for two hours the mixture was centrifugated for 7 hours to free it completely from bacilliary residue, after which it was neutralized and concentrated on a water-bath at 45° to one-tenth its volume; it was then used partly sterilized and partly after concentration only. The soda extract was neutralized with acetic acid, and, after washing the precipitate, concentrated to one-fifth its volume, after which it was dissolved in 1.2 per cent soda solution. The five extracts were tested in the conjunctiva of 309 cattle, being compared with phymatin. None of the extracts proved more active than phymatin. Equal in action was the redissolved precipitate of the soda extracts. The sodium-chloride extract was of nearly equal strength, while the hydrochloric extracts were less active. Tuberculization was found in about 71.1 per cent of all cattle tested by the phymatin ophthalmic reaction. The cattle were obtained from the vicinity of Dresden.—*Vergleichende Untersuchung über die Wirkung eiweisshaltiger Tuberkelbacillen-Extrakte auf die Conjunctiva des Rindes, W. Schulze, Dissertation, Leipzig, 1923, Abst. from Centralbl. f. d. ges. Tuberk.-Forsch., July, 1924, xxii, 342.*—(*H. J. C.*)

Ophthalmic Tests with Phymatin in Cattle.—Cattle previously given a number of subcutaneous injections of tuberculin to reduce their sensitivity reacted to phymatin ophthalmic tests in similar manner to those not previously injected. The sensitivity of the conjunctiva to phymatin is not altered by previous treatment with phymatin. If

there is any change there results an increased susceptibility. A diminution in the reaction strength occurred only rarely (in about 8 per cent). The interval between the test with phymatin and the occurrence of the reaction was shorter upon repetition than upon primary testing, being about one-half that of the first test. The duration of the reaction was reduced to half the time of the first reaction. Outspoken late reactions occurred in 7.81 per cent of the cases. In general, the succeeding tests developed earlier than the first one. Extraction of the fats from the tubercle bacilli by means of ether, xylol or chloroform does not influence the specific reaction in the conjunctiva of tuberculous cattle.—*Beiträge zur Augenprobe beim Rinde. G. Dultz, Dissertation, Leipzig, 1923, Abst. from Centralbl. f. d. ges. Tuberk.-Forsch., 1924, xxii, 343.—(H. J. C.)*

Complement Fixation for Diagnosis of Tuberculosis in Cattle.—Complement fixation has a certain definite value in tuberculosis. It is highly specific, and makes it possible to differentiate active tuberculosis, and for this reason is a valuable diagnostic aid. It is, however, only one of the diagnostic aids, and must not be given too great significance alone. Whether the same significance can be placed upon its value in human tuberculosis was not determined. Only large series of clinical cases will eventually determine its diagnostic, therapeutic and prognostic value.—*Die Verwendbarkeit der Komplementbindung bei Tuberculose, G. Seiffert and I. B. Meier, Beitr. z. klin. d. Tuberk., 1924, lviii, 370.—(H. J. C.)*

Tuberculosis of Udder.—There was a localized tuberculosis in a portion of the udder of a healthy cow in a healthy herd. The cow reacted to tuberculin. No tuberculosis was found elsewhere in the cow.—*Tuberculosis of the Udder, Case Report, United States Department of Agriculture, J. Am. Vet. Med. Assn., June, 1925, lxvii (new series, xx), 403.—(H. S. W.)*

Types of Pulmonary Tuberculosis.—Pulmonary tuberculosis is divided into three grades: disease extending to the clavicle and to the hilum or its vicinity, in the base of the lungs, and from the apices to below the hilum. In addition, every pulmonary tuberculosis is designated by its pathological anatomical form, the absence or presence of tubercle bacilli or of cavities, and its extent. There are, then, typically nine common characteristic forms: the almost absolutely unfavorable apical tuberculosis (closed, productive, without cavities), the almost absolutely favorable exudative tuberculosis (open, mostly third grade, with cavity formation), and the intermediate forms of productive, closed and open tuberculosis, second and third grades, with and without cavity formation. These main forms are closely related, and are difficult to differentiate absolutely. In cavity and exudative tuberculosis the prognosis is bad without the use of pneumothorax or plastic operation, and it is, therefore, if possible, advisable to operate. In spite of favorable results from conservative treatment in sanatoria, operation should not be withheld, since the results obtained in cavity and exudative forms by sanatorium treatment is only transient. Menstruation pyrexia occurs in 40 per cent of all tuberculous women, but is without any significance prognostically. Such periodic fever can occur months before puberty and is also seen after the climacterium. In the severe exudative cases occurring in previously healthy individuals the rapid progress can be explained only as the result of a failure of immunity. Hereditary susceptibility is without any appreciable influence in this respect. Any of the forms of tuberculosis can have an acute beginning, and not a small percentage of these, within a few months or years, can completely evolve without there being a prior apical tuberculosis or a closed disease of the second grade. —*Typische Formen der Lungentuberkulose, Braeuning, Beitr. z. Klin. d. Tuberk., 1924, lviii, 429.—(H. J. C.)*

Location of Primary Tuberculous Focus.—Five hundred postmortems, especially studied for the presence of the primary complex, are reported. In 119 this was established. The seat of the primary lesion in childhood is most frequently in the lower lobe, or at least in the lower part of the upper lobe. In the adult the most frequent site of the primary lesion seems to be the right upper lobe. The primary lesions are almost exclusively subpleural. With the exception of 2 cases the pleura was coincidently involved. In the region of the lungs 220 primary lesions were found, the next in sequence being the intestines, with 22 closed primary complexes. In 3 cases the primary lesion was found in the mesenteric lymph nodes; in three cases, in the larynx; and once in the trachea and once in a wound. As a whole, the author found 252 primary lesions. Unsatisfactory primary complexes were found 106 times: (1) only in lymph nodes in the lung region in 66 cases, and in the intestinal region in 3 cases; (2) only pulmonary lesions without lymph-node involvement, 37 cases. In 38 cases secondary changes were found without

locating the primary lesion. Thus, in 500 cases tuberculous changes were found in 58 per cent. A comparison of the tuberculin reaction in the living and the anatomical findings indicates that regularly there is found a tuberculous lesion in the body when there is a positive reaction.—*Beiträge zur Anatomie, Statistik und klinischen Diagnostik der Tuberkulose, F. Hesse, Beitr. z. Klin. d. Tuberk., 1924, lviii, 244.—(H. J. C.)*

Shape of Chest of Tuberculous and Healthy Japanese.—The distribution curve of the development of the transverse and sagittal diameters of the chest of both tuberculous and healthy types agree with the normal curve of Grous Pearson's law. The thoracic index of healthy Japanese is greater than that of the European. This is due to the flatness of the chest since the development of the chest in the sagittal diameter is not in proportion to that in the transverse diameter. The tuberculous type of chest is not as flat as has been previously regarded. There are several reasons for the previous conception, one being the position of the clavicles with the poor development of the chest as a whole and the tendency to flatness at the apex, and another the poor development of the muscles and subcutaneous fat. The index number of the circumference to the length of the sternum of the tuberculous type is much less than that of the healthy type. This is due to the poor development of the circumference of the chest. About 50 per cent of the tuberculosis cases have an index number less than 530, which is of some value in diagnosis. If the index number is less than 500, which occurs in about 15 per cent of the cases, it is a definite sign. In the healthy type about 50 per cent of the cases have an index number over 568, and 20 per cent of the cases over 640. The average index number of the tuberculous type, in body weight to body length, is 30, while that of the healthy type is 37. This is due to the poor development of the body weight. There are about 70 per cent of the cases of the tuberculous type which have an index number less than thirty. In the healthy type about 80 per cent have an index number over 37. The ratio of development of the transverse and sagittal diameters of the chest is about the same. This fact is not in accord with the view of earlier investigators that the shape of the chest of the tuberculous type is flatter than that of the healthy type.—*On the Special Features of the Shape of the Chest of Tubercular and Healthy Japanese, U. Hasegawa, Japan Medical World, 1925, v, 121.—(M. M.)*

Key Points in Lung Structure.—The anatomical unit or primary lobule of the lung consists of the alveolar passage (*ductulus alveolaris*) and all the remaining smaller divisions of the air tree (atria, air-sacs and alveoli) that are directly continuous with the *ductulus*. This latter structure represents a continuation of the air-passage through the small circular tube (*bronchiolus*) and the respiratory bronchiolus (*bronchiolus respiratorius*) with thin, irregular walls. The bronchial artery is in general the nutrient vessel to bronchi and pleura. The pulmonary artery courses near to the air-passages, and divides at every division of the air-passages, sending vessels to atria and air-sacs, and capillaries to the alveoli. Given this, relations of five key points may be better understood. These points concern themselves chiefly with points of origin of the various beginning branches of the pulmonary vein which are found (1) in certain areas in the pleura, (2) at the distal end of the *ductuli alveolari* from which these small radicles pass to venous trunks at the periphery of primary lobules, (3) at points where these radicles that arise at bifurcations of bronchi or bronchioli pass to larger venous trunks, (4) the distal end of a *ductulus alveolaris*, and (5) the place where a bronchus or bronchiolus divides. At each of these key points there are important anatomic tissues such as lymphatics and lymphoid tissue, connective tissue, septae, blood vessels, etc.—*Key Points in Lung Structure, W. S. Miller, Radiology, March, 1925, iv, 173.—(H. S. W.)*

Anatomy of Chest.—A summary of certain features in the applied anatomy of the chest which are of importance for the clinician.—*Notes on the Anatomy of the Chest, J. B. Hume, Tubercle, May, 1925, vi, 380.—(J. B. A.)*

Embryology and Histology of Lung and Pleura.—This is a summary and discussion of present views on phases of the subject. Particular mention is made of the work of William Snow Miller, published from time to time in the REVIEW.—*Notes on the Embryology and Histology of the Lung and Pleura, S. R. Gloyne, Tubercle, May, 1925, vi, 374.—(J. B. A.)*

X-Ray Studies on Bronchial Movements—X-ray films from the normal human thorax in the stages of full expiration and full inspiration show that there is an elongation of the trunk and all of the branches of the bronchial tree in inspiration, and a corresponding shortening of these structures in expiration. With these

changes there are associated similar movements on the part of the accompanying blood and lymph vessels, and of the nerves. Expansion and recoil movements of the lung substance are centered along the bronchial axes. Without this functional linear adjustment on the part of the trachea, bronchi and accompanying structures, respiration would be impossible. The anatomical basis for this stretching and shortening of the bronchi and trachea is to be found particularly in the elastic membrane of the bronchial tree, or *arbor elastica*, which extends throughout the entire air-way from the larynx to the outermost ramifications of the system, and is an interwoven stratum of longitudinally-coursing elastic fibres, which lies just below the epithelium, in the *tunica propria*. It permits of elongation of the tubes and effects their shortening and is, perhaps, the most important element in the recoil mechanism of the lung. Peripherally it is connected with the elastic tissue of the *infundibulae* and of the alveolar walls. In other ways the structure of the tracheobronchial tree is designed for such functional length changes, as, for instance, the looseness of the connective tissue between the cartilaginous rings or plaques, permitting widening and narrowing of these intervals, and the circular or spiral arrangement of the muscle fibers, which Miller has so well demonstrated. The character of the epithelium and its loose mode of fixation, too, permits ready adaptation to bronchial linear variations. A downward movement of the lower end of the trachea, main bronchi and lung roots was noted in passing from the phase of expiration to that of inspiration, and an upward movement during the transition from inspiration to expiration. These movements have a distinct and important physiological significance. It is largely due to the inspiratory downward shifting of the lower mass of the lung that the apical region is permitted to expand freely. Immobilization of the lung roots due to pathological conditions, by limiting this shifting, would tend to interfere with free apical expansion. It is possible that the explanation of the selective affinity of the tuberculous process for the postero-superior regions of the lung may be found in early inhibition of root movement. More widely, any pathological process which acts to stiffen the limbs of the bronchial tree will bring about functional disturbance in the part supplied by these limbs, and so will set up conditions favoring pathological processes. The interbronchial spaces show widening in inspiration, without material alteration in the direction of the bronchi. In the main bronchi an inspiratory dilatation and an expiratory narrowing was noted. With the descent of the diaphragm there is a descent of the heart, which undergoes a certain amount of narrowing, the apex shifting a little medially. The aortic arch permits of this freedom of heart movement. The arch acts somewhat like a spring upon which the heart swings up and down, the attached vessels adapting themselves by lengthening and shortening. —*X-Ray Studies on Bronchial Movements, C. C. Macklin, Amer. J. Anat., 1925, xxxv, 303.*

Caseous Pneumonia.—*1. Generalities:* Caseous pneumonia is a term that has fallen out of use and has even been given up by a number of modern authors, but it is worthy of being retained because it suits a very interesting and well characterized entity in phthisiology. It is pointed out that young persons, either apparently healthy or already tuberculous, are most often the victims of this malady, the onset of which is generally sudden and febrile like a frank lobar pneumonia, but which assumes a suspicious aspect during the period of red hepatization. Generally the suppurative disintegration of the consolidated area is rapid. Moreover, the abundance of tubercle bacilli in the rusty sputum, and other phenomena, establish the diagnosis of tuberculosis. Necropsy reveals in some cases the lung infiltrated with caseous masses already hollowed out into ragged cavities. In others a lobe or an entire lung will be consolidated without having given rise to bacilliferous expectoration, and necropsy will reveal a caseous hepatization of a large number of contiguous pulmonary lobules, a pseudolobar pneumonia, without the beginning of cavitation. Again, in infants there is seen in cases of prolonged pneumonia, often unrecognized as tuberculous, a lung consolidated by an inflammatory process that appears like pneumonia, but caseous throughout and containing cavities. The course of these pneumonias is nearly always rapid, being fatal in three or four weeks. *2. Microscopic lesions of caseous pneumonia:* Thanks to the presence of the tubercle bacillus these lesions are very specific. The bacilli are scattered along the bronchial tree and are stopped in different places as on the wall of a bronchiole, or further, on the wall of an alveolus, in the alveolar canal, or in the furthest part of the infundibulum. Three types of lesions may be distinguished: bacillary pneumonia, fibrinous pneumonia and splenization, in varying proportions. One fact stands out above all others; that is, that every part of the lung infected by the bacillus is quickly consolidated by inflammatory products, and very often such con-

solidation tends to rapid, hopeless caseation. *a. The bacillary bronchopneumonic nodule:* This nodule, however small or irregular, has its centre more or less clearly defined by an air-space, bronchiole, canaliculus or larger division, which is filled with opaque and friable caseous debris, made up of unrecognizable cellular elements. The elastic tissue of the wall resists destruction longest. In the beginning, every reaction of defense common to any lung infection takes place, hyperemia, proliferation of the epithelium, pouring forth of leucocytes and serum, but soon all the products of inflammation and the tissues of the air-passage become caseous from the poison of the bacillus. Then the peribronchial tissue and adjacent normal alveoli are attacked in the centrifugal advance of the process, because the lung does not bring forth sufficient granulation tissue to encompass the bacilli in a cicatricial barrier. Giant cells are rarely seen, and infiltrating cellular elements only become part of the caseous mass. Caseous bronchopneumonia is frequently lobular in distribution, and since all the ramifications are attacked by lesions of the same age it might be considered that bacillary products are pushed down from an intralobar bronchus which was infected first. This constitutes the descending method of advance. There is also evidence in some sections where the bronchus is cut lengthwise, more or less parallel to the surface, of an ascending of the caseous process, going from a very small bronchus to a larger air passage. In addition, the intralobular bronchus at times appears to have been affected for a longer time than the sublobular bronchus of which it is a tributary. The blood vessels of the lungs are also involved in the infection. The artery is finally obliterated, but pulmonary infarct does not occur because it is probable that caseation of the acini precedes. The infected clot of the veins extends in the direction of the blood-stream toward the hilum. The bacillary bronchopneumonic nodule is characterized, therefore, by the centrifugal, descending and ascending extension of specific bronchial and peribronchial lesions, and by the caseation of all tissues or organs attacked by the inflammatory process. In the presence of large areas of consolidation in the lung it is not always possible to establish a bronchial origin of all caseous pneumonia, and it becomes necessary to look for other inflammatory changes taking place between the bronchopneumonic areas. The first of these is: *b. Acute tuberculous fibrinous pneumonia:* A number of alveoli in the midst of multiple acute changes are filled with a fibrinoleucocytic exudate, very similar to that of acute pneumococcus pneumonia. In some forms of acute tuberculosis this exudate is scattered throughout the lung in large areas of red hepatization, with networks of fibrin which fills the air-spaces and swells the interstitial walls like ordinary acute pneumonia. At times the area of pneumonia seems to surround the bronchopneumonic nodule; again, to work its way between the caseous areas, so that one could imagine that an attempt is being made to wall off and enmesh the specific bacilli. Very often, however, caseation intervenes, and spoils this effort of defense. Though the exudate is similar to that seen in pneumococcus pneumonia, it is even at the beginning less rich in cellular elements and the fibrin appears more lamellar and less finely reticulated. When, however, the alveoli, alveolar canals and bronchioles, and the interstitial walls, especially the interlobular walls, are filled with fibrin, the resemblance is marked, and the question can be raised whether this process does not at times play a large part in the extension of caseous bronchopneumonic lesions. In short, fibrinoleucocytic hepatization establishes beyond the bronchopneumonic area an acute reaction, favoring the cicatricial encompassing of the bacillary lesion, but more often undergoing autolytic disintegration, which aids the suppuration of the caseous area and hastens the extension of cavitation. The other inflammatory change taking place between the bronchopneumonic area is: *c. Acute bacillary splenization:* One sees very often, for example, a considerable number of pulmonary alveoli bordering on a caseous area filled with an acute edema, which is associated in varying proportions with catarrhal, lymphocytic or serofibrinous alveolitis. Tubercle bacilli can be found in varying numbers. Often little areas of disintegration, not only of the cellular elements, but also of the alveolar walls, are seen as little opaque macules. Gelatinous infiltration differs from this in that large areas of alveolitis, at the same time edematous and macrophagic, loaded with tubercle bacilli, are transformed *in situ* into colloidal or gelatinous masses, which stick together and fuse. The alveolar wall, with its vessels and elastic tissue, disappears in the semiliquid mass. Thus, without hemorrhages, without suppuration, without any leucocytic diapedesis, important parts of the lung can be changed to a gelatinous deliquium. "Splenization" is, therefore, seen to be a very serious complication, because the areas involved tend to degeneration and seem incapable of the least cicatricial encystment. In summary, caseous pneumonia is a nodular bronchopneumonia, which by its

very nature tends to suppuration; beyond the nodule are found two acute lesions in variable proportions, "splenization" and fibrinous hepatization, which often tend to hopeless, autolytic disintegration of the lung tissue.—*La pneumonie caséuse, M. Letulle and F. Bezançon, Presse Méd., February 11, 1925, no. 12, 179.*—(*E. H. K.*)

Occupational Pulmonary Fibrosis.—Marked dyspnea on slightest exertion is an outstanding feature of gold miners' phthisis. Chest expansion is diminished. Here and there in the chest small areas of dulness are appreciable, especially toward the base. The respiration is deficient in places, while over other portions of the lung there can be heard small bronchial râles: but whether râles are heard or not the dyspnea is always in excess of the physical signs. Occasionally the disease progresses to a fatal termination without the lungs becoming tuberculous. The lungs would be found greyish-black in color, hard to the touch, stony hard in fact, and giving rise to a gritty sensation on being cut with a knife. In the lungs there may be no signs of cavity, so that silicosis, in its inception and all through its course, can be, and frequently is, a nontuberculous disease. Some of the patients subsequently become tuberculous. Of the various kinds of dust inhaled by workmen, that which contains silica is one of the most dangerous. Formerly it was thought that the injury inflicted upon the lung was the result of physical action of the dust particles. When fine particles of soft coal are inhaled these are met by a reactive resistance on the part of the bronchial mucous membrane and the pulmonary alveoli, during which the large wandering cells lying in the alveoli or on the inner surface of the minute bronchioles, takes up the carbon particles, and, as these are phagocytic in their function and are subsequently passed up into the bronchi, many of the carbon particles which have been inhaled are eliminated. Silica dust, on the other hand, is not readily soluble, nor are its particles easily phagocytosed; they penetrate into the lymphatics of the lungs and are carried to the lymph nodes of the hilum, or they induce pulmonary fibrosis. Although silica dust is very insoluble, it may become soluble in the lungs, and the dissolved material is equally capable of acting harmfully on the pulmonary tissue. The injury thus inflicted would be, not the result of the physical, but of the chemical properties of the dust. Pathological research has shown that the larger number of particles present in the lungs are below one micron and seldom above two, although they may sometimes measure ten micra or more. It would, therefore, appear that it is the particles below two micra which are the most dangerous. As to utility of water spraying in rock drilling there can be no doubt; but, while water spraying allays dust, many of the finest particles may yet rise into the atmosphere with the spray, and, although these particles may not be visible, it is they which, when inhaled, harmfully affect the lungs. Asbestos dust may cause pulmonary fibrosis. While mineral dust is a frequent cause of fibrosis, the structure of the lung can be similarly altered by microorganisms or their toxins in such diseases as tubercle and syphilis. There occurs early in some forms of influenza a rapid tendency to the development of pulmonary fibrosis. In these cases the epithelial lining of the smaller bronchi and the alveolar walls become rapidly destroyed. Just as rapidly reparative processes take place and, as a result, occlusion of several of the minute bronchi occurs; the alveolar walls, too, are thickened by the organization of fibroblasts; newly formed capillaries extend into the leucocytic exudate, whereby this material becomes changed into granulation-like tissue. In almost a similar manner the bronchopneumonia which follows measles is followed by an increase of the interstitial tissue of the lungs. There is a growing opinion that a silicotic lung is more liable to become affected by tubercle than a nonsilicotic lung.—*Occupational and Other Causes of Pulmonary Fibrosis, T. Oliver, Brit. M. J., April 11, 1925, no. 3354, p. 685.*—(*B. T. McM.*)

Predominantly Bronchial Tuberculosis in War-Gassed Patient.—It is generally admitted that intoxication by war gasses, especially yperite, commonly results in bronchopulmonary sclerosis, leading to attacks of bronchitis, to emphysema, and to adenomediastinitis, as shown radiologically by Sergent; also, there is a general agreement that pulmonary tuberculosis is a rare sequel. The only dissenting published opinion seems to be that of Hankins and Klotz, who believe that two-thirds of the chronic gassed cases followed became tuberculous. However, they fail to furnish bacteriological proof, and their clinical conceptions of the diagnosis of tuberculosis seem archaic. Martin cites a case which he believes is of peculiar interest. The patient, severely gassed at the Marne in 1918, was later troubled with periodic bronchitic attacks. Late in 1923 his general condition became affected, with marked fatigue and profuse sweats. The sputum was found positive for tubercle bacilli, and this was confirmed by the Committee on Invalidism which awarded him complete disability.

He complained especially of dyspnea and pain in the side, and frequent cough. Physical signs were merely those of a mild bronchitis. Radioscopic examination showed an obscured left costodiaphragmatic sinus, while radiography showed no evidence of a parenchymatous lesion but merely compact hilar shadow and a particularly marked bronchovascular network in the right lower lobe near the diaphragm. The patient spent five months at Clavières sanatorium, where his symptoms improved. The sputum was twice positive there, but bacilli very scanty. He is now working in the fields as far as his dyspnea permits. He has had crises of nocturnal asthma, with eosinophilic sputum. Bezançon and deJong consider the association of asthma and pulmonary sclerosis common. *Discussion:* The relation of the tuberculosis to the severe gas poisoning deserves consideration. Either an old tuberculous focus may have developed, following the traumatism, or late secondary tuberculous changes may have occurred in the sclerotic bronchopulmonary lesions started by the yperite. The clinical history favors the second supposition. It is true that the term "bronchial tuberculosis" is vaguely defined and some deny its pathological entity. The diagnostic criteria appear to be: *1.* Presence of tubercle bacilli in the sputum. *2.* Absence of signs or evidence of parenchymatous localization. *3.* Presence of clinical signs of bronchitis. Tuberculous bronchitis is probably rare, and, as there may be some unrevealed parenchymatous focus, some prefer the term "tuberculosis of predominantly bronchial type." It seems possible that gassing may bear a causal relation to this unusual form of localization. —*Sur un cas de tuberculose à prédominance bronchique chez un ancien gazé de guerre, A. Martin, Rev. de la Tuberc., January, 1925, vi, 67.*—(*A. P.*)

Hematogenous Dissemination in Pulmonary Tuberculosis.—Differences in clinical picture and course and X-ray appearance of a small number of tuberculous patients occasionally occur. In these cases the roentgen plate shows a widespread seeding, although the distribution need not be uniform, for one lobe, upper or lower, may contain many more little islands than the remainder of the lungs. There may also be signs of enlargement of the tracheobronchial lymph nodes, and some of these may be calcified. In some there may be harsh breathing over the entire lungs, in others fine râles in the lower lobes. The degree of roentgen-ray findings is always greatly out of proportion to the meagre physical signs. Usually clinical symptoms are slight, especially early in the disease. These are slight or no elevation of temperature, sometimes dry cough, lassitude and a little cyanosis. Many times the miliary condition is discovered by accident, either by X-ray or by autopsy in a patient who has died from tuberculosis in another part of the body or lungs or from some other disease. This form of tuberculosis seems to be an entity in itself. The uniform distribution must represent a dissemination of bacilli through the blood. The severity of this type is in more or less inverse proportion to the severity of the other tuberculosis of the body, and also depends upon such external influences as malnutrition, pregnancy, intercurrent diseases, etc. All types of disseminated miliary tuberculosis (of the lungs) are entities.—*Klinische und röntgenologische Beobachtungen bei hämatogen disseminierten Lungentuberkulosen, W. Amelung and H. v. Hecker, Klin. Wchnschr., January 29, 1925, iv, 204.*—(*H. S. W.*)

Origin of Phagocytic Cells of Lung.—Since the lung of amphibians and reptiles is transparent and can be distended outside the body wall, it affords an opportunity to study the ingestion of particulate matter *in vivo*. The structure of this organ in these lower animals in general plan is so much like that of the higher animals, that the establishment of the origin of the phagocytic cells formed in it may throw some light on the formation of the same type of cells in mammals. The results of observations chiefly on the lungs of frogs following intracardial and other methods of injection of a small quantity of suspension of india ink are given. The study of the formation of the phagocytic cells in the lung of the frog is not complicated by the presence of preexisting clasmatocytes, as it is in the lungs of birds and mammals, for there are only a few of these cells and they are easily identified by reason of their ingested material (red blood cells and melanin granules). In the frog there are no dust cells. The first thing noted was that the carbon, as it came in contact with the colloidal solution of the blood, began to agglutinate; so that, instead of a fine suspension of microscopic particles, there were formed in the blood-stream much larger particles and some threads of different sizes, which stuck to the white blood cells and occasionally to the endothelial cells, not only in the capillaries but also in the larger vessels. The greatest number of phagocytic cells could be produced by injecting (intracardial route) a small quantity of a weak suspension of the ink in two or three doses, all within one minute. Often within two or three minutes after the

carbon had been injected into the heart none of it was to be seen circulating in the blood-stream. Within the first few minutes, when the phagocytic cells were being lodged within the lung, there could be no question but that these were leucocytes arrested in the capillaries, but, after a few hours, unless it had been possible actually to follow the phenomenon, it would have been more difficult to identify these cells, for the large mononuclear cells not only ingested the carbon, but divided by mitosis and exhibited all the changes which the authors have previously shown these cells undergo in hanging drop culture of blood alone; that is, they hypertrophy and become clasmatocyte-like cells. The epithelial cells never were observed to ingest any of the carbon, and the air-sacs remained intact. The endothelial cells also remained unchanged and were not observed to become macrophages. They neither rounded up nor divided to form phagocytic cells, as claimed by Foot and Permar. The question as to whether these phagocytic cells may be released from the liver and spleen is one easily answered in the frog. In this animal, the Kupffer cells of the liver are large and easily recognized. There was no increase in the number of these clasmatocytes following the injection of carbon into the blood-stream, and the many carbon-laden cells that accumulated in the lungs did not contain ingested red blood cells, melanin granules, or bilirubin crystals; they were unquestionably leucocytes. In four frogs the spleen was tied off before the injection was made. In no instance was a decrease in the macrophages of the lung noted. Another method of obtaining phagocytic cells in the lungs of the frog was by injecting a small amount of the suspension of carbon into the dorsal lymph sac. This resulted, as a rule, in the presence of many such cells within an hour. The cells carrying carbon entered the lungs, and the further phenomena occurring there were similar to those observed when the injection was made directly into the heart. Following the injection of carbon into the air-spaces of the lung, no carbon appeared in the blood-stream or in the endothelial cells. There were no macrophages laden with black. When hanging-drop preparations of the blood taken from the heart were made, large phagocytic cells containing carbon were formed, regardless of whether the carbon had been introduced into the heart, lymph sac, or abdominal cavity. The same type of large phagocytic cell was formed in cultures of the blood, when no carbon had been introduced. The cell resembled a clasmatocyte and often contained ingested red blood cells. Observations of others in the past have led to two conclusions, each of which is supported by a number of investigators. The first is that the phagocytic cells of the lung arise *in situ* from the endothelial cells of the lung; and the second, that the phagocytic cells arise immediately from the liver and spleen. On the contrary, the author of the present article found that the phagocytic cells which accumulated in the lung of the frog following the introduction of carbon originate from leucocytes of the circulating blood and not from the endothelium *in situ*, nor as showers of macrophages from the spleen and liver.—*Origin of the Phagocytic Cells of the Lung of the Frog, M. R. Lewis, Johns Hopkins Hosp. Bull., May, 1925, xxxvi, 361.*—*(J. S. W.)*

Leucocytes in Pulmonary Tuberculosis.—Schilling's technique was used on 110 cases of pulmonary tuberculosis. Especially significant was the behavior of the eosinophiles which proved most susceptible to infection and intoxication. In marked intoxication there occurred a diminution or complete absence, at the conclusion of which there was an absolute or relative increase even in severe cases. The high eosinophile ratio was only temporary. In individual spontaneous reactions the eosinophile phenomenon was insignificant, especially in those cases in which, in spite of a reduction of temperature, there was definite toxicity. Persistent eosinophilia seemed to forecast permanent improvement, which is believed to be the index of action of autotuberculin. In the spontaneous reaction there was an increase of the lymphocytes, which in unfavorable cases terminated in a lymphopenia. A parallelism between the disease condition and the blood picture is not always evident. Repeated examinations are desirable on account of the transient nature of the blood changes.—*Beitrag zur Kenntnis des weissen Blutbildes bei Lungentuberculose, vor allem bei tuberkulösen Spontanreaktionen, II. Schulte-Tigges, Ztschr. f. Tuberk., 1924, xl, 332.*—*(H. J. C.)*

Transformation of Leucocytes into Epithelioid Cells.—By a simple technique, originated by the authors, it is possible to prove beyond question that white blood cells in man and in certain other animals, fishes and reptiles, can give rise to clasmatocytes, epithelioid cells and giant cells of the Langhans type. Small drops of whole blood, taken under aseptic conditions from the heart or periphery, made into ordinary hanging drops and kept at suitable temperatures, contain after a few days (from two to twenty-one) varying numbers of hypertrophied and highly phagocytic cells, and

all transitions between them and the large mononuclear cells. Some of these hypertrophied cells are precisely like clasmatocytes, for they contain granules, vacuoles and partly digested material showing a marked affinity for neutral red. All intermediate stages between the typical clasmatocyte, with its irregularly distributed granules, vacuoles, ingested material and fat globules, and the typical epithelioid cell, with its granules centrally and radially arranged about the centrosphere, are abundant. The latter are exactly similar to the epithelioid cells of tuberculous lesions. There is every indication that the clasmatocytes and epithelioid cells are merely different functionating states of the same cell. It is probable that the epithelioid cells arise either directly from the large mononuclears or from the clasmatocytes. In the latter case, as the large ingested masses within the clasmatocyte become digested, the resulting debris in the form of granules accumulates about the centrosphere and thus forms the gradually increasing central area so characteristic of epithelioid cells. Giant cells of the Langhans type are common in some of the blood cultures, and are of exactly the same character as the epithelioid cells. They contain from two to many nuclei arranged in the characteristic manner about the large central area. There is no evidence whatever that these cells arise by fusion of mononuclear epithelioid cells. They probably arise by division of the nuclei without division of the cytoplasm. Such transformations in the cultures described above suggest that in the spleen, where the blood current is sluggish, a somewhat similar condition prevails, and is responsible for the fact that there a similar phagocytosis of injured red cells by leucocytes takes place, with resulting clasmatocyte formation. Since blood cells that wander out into tissue spaces may encounter conditions somewhat analogous to those in the hanging drop, it is reasonable to conclude that there they change into clasmatocytes and, under certain conditions, into epithelioid cells and giant cells.—*The Transformation of White Blood Cells into Clasmatocytes (Macrophages), Epithelioid Cells, and Giant Cells, M. R. Lewis and W. H. Lewis, J. Am. M. Ass., March 14, 1925, lxxxiv, 798.*—*(J. S. W.)*

Epithelioid Cells of Tuberculous Lesions.—From time to time investigators in the field of tuberculosis have returned to the puzzling question of the origin and nature of the epithelioid cell, the essential cell in tubercle formation. The predominating theories of origin, that they come (1) from connective tissue, (2) from endothelium, or (3) from leucocytes, still have ardent supporters. The observations reported are confined to the question of the relation of these cells to the leucocytes. A study of the living epithelioid cell was made on fresh living tissue-spreads of tubercles and tuberculous lungs. Fully developed cells are very conspicuous when stained supravitally with neutral red. Also observations were made on spreads of normal lungs, on cultures of tuberculous and normal lungs in autoplasma, and on cultures of normal blood. A study of the blood cultures (rabbit's blood) definitely showed that both epithelioid cells and macrophages can arise directly from the blood cells, the large mononuclears undergoing hypertrophy and exhibiting high phagocytic powers, especially for red-blood cells. These hypertrophied cells show an astonishing similarity to true epithelioid cells. Since these cells form in stagnant hanging-drop blood cultures and in cultures of normal human lymph nodes, there can scarcely be anything specific about the tubercle bacillus that is responsible for this transformation from blood cells, as Maximow has suggested. The clasmatocytes, or macrophages which arise from the monocytes, are characterized by many large masses of ingested and partly digested stuffs which more or less completely fill the cell, obscuring the centrosome and often the nucleus. The principal difference between the clasmatocyte and the epithelioid cell seems to depend upon the amount, character, and condition of the ingested stuffs. In the conclusion the similarity in appearance between the epithelioid cells of the tuberculous lesions and the epithelioid cells formed by the transformation of the monocytes in the blood cultures is reiterated.—*The Epithelioid Cells of Tuberculous Lesions, M. R. Lewis, H. S. Willis, and W. H. Lewis, Johns Hop. Hosp. Bull., March, 1925, xxxvi, 175, and Tubercle, April, 1925, vi, 329.*—*(J. S. W.)*

Leucopenia in Tuberculosis.—In a study of 45 cases leucopenia was found to be often associated with uncomplicated tuberculosis with high fever. A leucopenia in obscure febrile diseases should cause one to think strongly of tuberculosis. Prognosis in tuberculosis with increased lymphocytosis and decreasing polynuclears is good, and is bad if there is a progressive increase in the polymorphonuclears associated with a decrease in lymphocytes.—*Leukopenie und Tuberkulose, ein Beitrag zur Diagnose und Prognose der fieberhaften*

Tuberkulose auf Grund des Blutbildes, W. Jülich, Deutsche med. Wchnschr., March 6, 1925, li, 391.—(H. S. W.)

Leucocytes after Ektebin Treatment.—As a result of the examination of 22 children given *Ektebin* inunction, it was found that in mild and moderately severe cases of bronchial lymph-node tuberculosis there occurs within 6 to 9 hours after the inunction an outspoken leucocytosis, parallelling the temperature reaction. The percentage relationship between the polynuclears, neutrophiles, lymphocytes and eosinophiles revealed no characteristic changes.—*Über die Veränderung des weissen Blutbildes nach Ektebineinreibung bei der Säuglings- und Kindertuberkulose, F. Mündel, Beitr. z. Klin. d. Tuberk., 1924, lviii, 297.—(H. J. C.)*

Different Aspects of Heredity in Tuberculosis.—*Intrauterine infection with tubercle bacilli in small number:* The following subjects are considered in the light of more recent work: Infection of the foetus with a small number of tubercle bacilli; conditions of transplacental infection; proved congenital tuberculosis; latent congenital tuberculosis. The authors conclude as follows: 1. Proved congenital tuberculosis remains extremely rare, despite the new cases published in recent years. It results usually from transplacental infection, and is rapidly fatal. When it exists there is death of the foetus *in utero* followed by abortion, or still birth, or congenital debility with death in the first few weeks or months of life. Clinically, it is identically like early acquired tuberculosis in the infant. Anatomically, it is often localized in the liver or lymph nodes, but may be of the skin; the skin reaction may be positive but may also be negative. Also, one may say that progressive congenital tuberculosis affords no certain criteria of diagnosis, either clinical, biological or anatomical. Etiology alone argues the certainty: absence of any tuberculous postnatal contact, the infant having been removed from any contamination from the moment of birth. Latent congenital tuberculosis is only an hypothesis, which the facts do not establish. Recent studies on tuberculous bacillaemia, on discrete tuberculosis of the placenta, on the histology of the normal placenta, bring some presumptive evidence for this theory. However, the proponents of this idea bring no proof: no positive inoculations of blood from the umbilical cord of infants born healthy in appearance and not becoming tuberculous for a long time when removed from all contact; no positive inoculations of lymph nodes from infants born of tuberculous persons, separated from birth and dying of nontuberculous disease. In the final analysis a summing up of the evidence shows also the inability of our usual methods of attack to solve the problem of heredity in tuberculosis. The clinic, autopsies and inoculations afford no absolute arguments and leave the problem in suspense. There must be a new method of approach, a true experiment in human medicine: the prolonged observation for years of children of tuberculous parents removed at birth and shielded from any postnatal contamination. Only such observations can bring about a real scientific solution.—*Différents aspects de l'hérédite tuberculeuse. La contamination paucibacillaire, R. Debré and M. Lelong, Ann. d. Méd., March, 1925, xvii, 209.—(W. B. S.)*

Distention of Heart on Inspiration, and So Called Pulsus Paradoxus.—The pulsus paradoxus, a diminished amplitude of the radial pulse with inspiration, first described by Griesinger, and later by Kussmaul in 1873, was regarded by the latter as an infallible sign of cardiac or mediastinal adhesion. He believed that the enlargement of the thorax in inspiration increases the burden imposed by the pathological mediastinal adhesions on the circulation in the large veins (venae cavae and pulmonary veins), and that the heart, less completely filled on this account, sends a smaller volume of blood into the arteries with each systole occurring during inspiration. Others accepted the sign as such, but demonstrated that Kussmaul's explanation was incorrect. Still others have maintained that the sign is not pathological, but represents merely an exaggeration of a physiological phenomenon. The authors of this article bring evidence to confirm the last point of view. Wenckebach in 1910 analyzed this form of pulse and divided the causes into three groups: (1) extrathoracic, in which the cause is essentially a pressure on the subclavian artery at some point; (2) mechanical, in which the layers of the pericardium are adherent and the heart is adherent to the neighboring organs, the cases which occur rarely and which Griesinger and Kussmaul had in mind; and (3) dynamic, the form discussed in this article, and that in which the inspiratory increase in the elastic traction exercised by the lung on the walls of the thorax is exaggerated. Since this inspiratory traction meets with resistance on all other sides it is the heart and great vessels which suffer the maximum effect. Fill-

ing of these organs, and diastole are aided; their emptying and systole are hindered. To determine whether the lessened filling of the radial pulse with inspiration is to a certain extent a normal physiological occurrence, the authors of the present article first took blood-pressure readings, using the auscultatory method. By inflating the cuff to complete obliteration of the artery, and then gradually lowering the pressure, the inspiratory systolic pulse is at first less loud than the expiratory systolic pulse. The reverse is never true. The difference is often to be noted in pathological cases and in a good number of normal cases. Such being the case with so relatively gross a method, the authors set about to determine whether the phenomenon is constant with a more delicate method, such as the graphic. Tracings of the respiration and of the radial and tibial pulses were made in ten perfectly healthy persons, aged 24 to 30 years. These tracings show that the pulsus paradoxus occurs constantly in the course of normal quiet respiration, provided there is maintained in the sphygmomanometer cuff a pressure about 1 cm. lower than the systolic pressure of the expiratory phase. While this phenomenon is demonstrated to occur in the normal case, it is much more pronounced in certain pathological conditions, particularly those which diminish the extensibility of the pulmonary parenchyma. Bilateral pulmonary sclerosis is the best example, and unilateral sclerosis shows it markedly, though to a lesser degree than the bilateral. Thoracoplasty produces changes in respiratory dynamics very comparable to those of unilateral sclerosis. Artificial pneumothorax presents all the conditions necessary for the production of pulsus paradoxus, but it is here the loss of the braking effect of the lung tissue which causes the heart to dilate more widely on the side of the pneumothorax. A case in which the inspiratory fall in pressure was at its maximum was one of sclerosis of one lung following an artificial pneumothorax of long standing, and a later collapse of the other lung on account of spread of the disease. Likewise, the presence of an abundant pleural effusion or of a hydrothorax limits the extensibility of the lung and thereby produces the phenomenon. Severe emphysema also shows marked pulsus paradoxus.—*La distension cardiaque inspiratoire et la pouls prêtendu paradoxal, E. Rist and J. Walser, Ann. d. Méd., April, 1925, xvii, 307.*—(*W. B. S.*)

Functional Correlations between Lungs and the Heart.—The author takes up in review certain phenomena revealed by fluoroscopic examination, and more particularly those having to do with functional correlation between the respiratory and circulatory organs. The first subject is inspiratory displacement of the mediastinum. This occurs, provided, of course, that the mediastinum is movable, when a principal bronchus is stenosed near its origin, whether from an intrinsic or extrinsic lesion. With inspiratory expansion of the chest-wall the pressure in the lung in which the bronchus is not obstructed almost immediately becomes that of the atmosphere. The opposite lung, on the other hand, receives its air more slowly, due to its obstructed bronchus, and there results a loss of equilibrium, with the pressure on the normal side higher than on the opposite side, and a resulting movement of the mediastinum and its contents to the side of lower pressure. On expiration the lung of the obstructed side empties itself less quickly than the normal lung with the pressure conditions reversed; the mediastinum now moves to the well side. If the causal lesion is a unilateral bronchostenosis and the patient holds the breath after inspiration the mediastinum returns to its normal position. This fact serves to differentiate inspiratory pulling of the mediastinum due to unilateral bronchial stenosis from that due to other causes, notably lung conditions in which there is impairment of the elastic distensibility of one lung as compared with the other, as in extensive unilateral pulmonary sclerosis, no matter what its etiology. These latter cases are not uncommon, and it is surprising that radiologists so seldom mention this frequently occurring sign of pulmonary sclerosis when they so often speak of other radio-visible changes, which to the author's mind are much less reliable. Inspiratory displacement of the mediastinum is the more appreciable the denser and more extensive the sclerosis. But there are certain cases in which the phenomenon is seen, despite a definite pulmonary sclerosis, due to the fact that the chest expansion is restricted. A practically normal expansion is a *sine qua non* of the sign. The phenomenon is quite independent of any participation of the pleura in the sclerotic process. The most extensive and firm pleural adhesions will not by themselves produce it. Another most interesting cause of inspiratory displacement of the mediastinum is pneumothorax, particularly artificial pneumothorax, in which the phenomenon is practically constant. The enlargement of the pneumothorax cavity on inspiration lowers the pressure on that side

to a relatively considerable degree, thereby drawing a mobile mediastinum toward the pneumothorax. Rist is not satisfied with the usual explanations of the Kienboeck phenomenon; he accepts neither the theory of a hemiparalysis of the diaphragm nor that of a change in its curve. Instead, he maintains that the fluid level rises with inspiration because the mediastinum is pulled to the fluid side with inspiration, thereby narrowing the chest cavity, and on that account producing an elevation of the fluid level. Two other phenomena, occurring however but rarely, are systolic distention of the collapsed lung, and a regular vibratory movement of the compressed lung, of slight amplitude and of a rhythm double or quadruple that of the heart. Still another sign, and this time of gas or air occupying the mediastinum, is a unilateral exaggeration of the amplitude of the cardiac beat. This phenomenon, like that of bilateral exaggeration of the heart-beat observed in pneumopericardium, is due to a suppression of the braking effect of the normal pulmonary elasticity upon the cardiac contraction. Generalized sclerosis of both lungs and severe emphysema determine an inspiratory dilatation of the heart, demonstrable by fluoroscopy. When the chest expands due to the contraction of the inspiratory muscles some organ within the thorax must yield. The lungs on account of their fibrosis or loss of elasticity resist expansion much more than normally, and it is the heart which expands and to both sides. Ultimately the heart becomes no longer equal to its task. This theory appears more plausible than the current one to explain the cardiac insufficiency observed in bilateral pulmonary sclerosis and severe emphysema. In the latter condition there is apparently a contradiction from the standpoint of pathology. Here, however, the explanation lies in the fact that the lung parenchyema, having lost a considerable part of its elasticity and being already more or less expanded, is unable to expand further with the inspiratory increase in the size of the thorax and therefore pulls upon the heart with inspiration just as does the sclerosed lung.—*Quelques corrélations fonctionnelles entre les poumons et le coeur avec une digression sur le phénomène de Kienboeck, E. Rist, Ann. d. Méd., April, 1925, xvii, 285.*—(*W. B. S.*)

Oxygen Content of Arterial Blood in Pulmonary Tuberculosis and in Artificial Pneumothorax.—If, in a portion of the lung where air does not penetrate, the blood continues to circulate, this blood, venous on entrance, will flow out unmodified and, mixing in the left auricle with oxygenated blood from the other lung, will lower the content of oxygen in the arterial blood of the general circulation. If, on the contrary, the blood no longer circulates in this same collapsed portion of the lung, there will be no diminution of oxygen in the arterial blood, provided the blood traversing the normal pulmonary parenchyma is as well oxygenated as beforehand. On the above supposition a study was made of 20 cases of artificial pneumothorax, in 7 of which the oxygen content of the arterial blood was measured before and after the introduction of gas into the pleural cavity. With the exception of one case of bronchiectasis, all of the subjects had unilateral pulmonary tuberculosis. Two patients had bilateral pulmonary tuberculosis. *Results:* There was no modification of the normal oxygen content of the arterial blood, either in 7 cases of unilateral tuberculosis or in the 2 cases of bilateral disease. The conclusion seems warranted that the blood circulates scarcely at all in the pulmonary vessels of the collapsed portions of the tuberculous lung. Among the 20 cases of artificial pneumothorax, 15 showed an oxygen content of the arterial blood equal to or above 95 per cent. In 5 cases, on the contrary, there was an evident anoxemia, the lowest being 80 per cent of normal. None of the 5 cases, observed at rest, had any cyanosis or signs of cardiac insufficiency. At the moment of drawing the blood, there were noted: The degree of collapse of the lung, the mean intrapleural pressure, the displacement of the mediastinum and the duration of the collapse. None of these could be regarded as solely responsible for the anoxemia. The hypothesis is advanced that in 5 of 20 cases there was a venous short circuit across the collapsed lung. In 15 cases on the other hand the intrapulmonary circulation was to be regarded as practically suspended.—*La teneur en oxygène du sang artériel dans la tuberculose pulmonaire et au cours du pneumothorax artificiel, Hilton, Ann. d. Méd., April, 1925, xcii, 322.*—(*W. B. S.*)

Resorption Factors in Lung.—Respiration is considered an important factor in the resorption of fluids and corpuscular elements in the lungs. The stimulus for the formation of specific antibodies in the body cells forms the autotuberculin, which is brought to the cells from the tuberculous pulmonary lesions. By proper management it is considered that each case can be so regulated as to develop an optimum which will pro-

tect it against its own autotuberculin and thus aid in he combat against the infection. —*Welche Kräfte besorgen die Resorption im Lungengewebe? L. Hofbauer, Beitr. z. Klin. d. Tuberk., 1924, lviii, 240.*—(*H. J. C.*)

Intensity of Light Rays.—On a scale, in which the chemical and caloric energy of the sun's rays are both considered 100, the chemical energy liberated from arc and Sollux lamps is 5.5 and 3.3 respectively, when the lamps are delivering an amount of heat equal to that of the sun's rays. The quartz lamp gives off no heat, but 25 per cent chemical energy on the same scale. The pigmentation which results from irradiation is due exclusively to the short-wave, chemically active rays. The chemical energy is more effective at higher temperatures, following the principle of the vant'Hoff law. The biological and therapeutic action of a source of light, therefore, depends on the relation of the caloric to the chemical energy. The effect of a source of light of low chemical energy, but associated with much caloric energy, may easily surpass that of rays of high chemical but low heat energy. The sun, which combines in greatest amount the two types of energy, has therefore the most marked biological effect. The arc and Sollux lamps are next in value. The quartz lamp suffers from the complete lack of heat rays. For its best action artificial heat is needed. The fact that skin erythema results more quickly from the action of the quartz lamp than from the sun's rays, does not contradict the conclusion that it is of lower biological effect than the other sources mentioned. The short rays are responsible for the erythema, but the physiological effect, as indicated by pigmentation, is lower.—*Die Strahlenintensität der therapeutischen Lichtquellen, B. Micklinghoff-Malten, München. med. Wchnschr., June 26, 1925, lxxii, 1072.*—(*E. R. L.*)

Ultraviolet Rays of Sunlight.—It was not until it could be shown objectively in man and in animals, by means of the roentgen ray and by chemical analysis of the blood, that a nutrition disturbance, rickets, came about as the result of a lack of the ultraviolet solar rays, and could regularly be cured or prevented by these irradiations, that their importance in physiological and pathological processes was fully appreciated. These rays constitute less than one per cent of the solar radiations, and it is, therefore, all the more remarkable that they should be essential to the well-being of man. As to their action, it has been repeatedly shown that they possess very little power of penetration; that the dust or the moisture of the atmosphere suffices to absorb the shorter ultraviolet rays and prevent them from reaching the surface of the earth; that mist, fog and smoke intercept their progress to a greater or less degree. This is true of the tenuous skin that surrounds the hen's egg. Window-glass filters out all but the longer and less potent of these rays. *Conclusions:* Rickets affords an excellent criterion for the investigation of the biological activity of the sun's rays, for we know within narrow limits the band of ultraviolet radiation that is effective in curing or preventing this disorder. A comparison of the yearly amount of actual sunshine in cities in the temperate zone demonstrates that there is no close parallelism between the incidence of rickets and sunshine. It shows, furthermore, that the occurrence of rickets does not depend on an equable distribution of sunshine throughout the year. In the Panama Canal zone, where rickets is practically nonexistent, not only is the yearly sunshine less than in New York, but it is less evenly distributed; there are fewer hours of sunshine during the rainy season in Colon or Ancon than the corresponding winter period in New York. The determining factor is the quality, not the quantity, of the sun's rays, the amount and intensity of the short ultraviolet rays, which are of value in preventing rickets. The results of heliotherapy during the winter months have been disappointing, owing to the fact that the "antirachitic region of the solar spectrum" is very limited at this season, and that the infants cannot be exposed directly to the rays on account of the severity of the climate. It would seem that the amount of the solar radiation is so small in winter that, even if we substitute quartz panes for ordinary window glass it will be insufficient to afford protection and eradicate the disease. The most promising prophylactic measures are ultraviolet light from artificial sources, or the use of codliver oil, or potent extracts of this oil. Possibly foods that have been activated by irradiation will prove of value in this connection; for example, dried milk that has been rendered antirachitic by this means. Something also may be accomplished in this direction by improving the hygienic condition of the milch cows. At present many of these furnishing the best grade of milk are kept throughout the year in sunless barns, are allowed a very limited amount of exercise, and receive little or no fresh green fodder. —*The Ultraviolet Rays of the Sun, A. F. Hess, J. Am. M. Ass., April 4, 1923, lxxxiv, 1033.*—(*B. T. McM.*)

Intrathoracic Changes from Heavy Radiation with X-Rays.—This article discusses in detail the development and nature of the changes occurring in the normal tissues within the chest, incident to the application of heavy radiations such as are necessary in the therapy of certain tumors. A single large dose or repeated smaller doses of roentgen rays produce a reaction in the normal intrathoracic structures similar to that observed in other tissues more accessible for study, as, for example, the skin. First, a hyperemia develops, soon followed by an edematous infiltration of the tissues, which in the majority of cases, especially if there is no alteration in the permeability of the capillaries, clears up. Larger or repeated doses, however, may result in a nonresorption of the edematous infiltration, probably because of injury to the blood vessels. This is followed by a fibroblastic proliferation, which in turn leads to extensive fibrosis of the structures exposed. This condition is identical to that observed in fibrosis of the lungs produced by other pathological agents, such as toxins (croupous pneumonia). The prognosis of the edematous infiltration is good. The changes usually clear up without leaving any anatomical or functional disturbance. However, the patient is rendered more susceptible to bronchial or pulmonary infection. The fibrosis has different prognoses according to the degree of extension. A slight fibrosis usually produces no inconvenience, and is only accidentally discovered. A fibrosis extending through one entire lung may produce rather severe symptoms, because of the impairment of the function of such a vital organ. The prognosis as to duration of life even here is not unfavorable. Statistics of 80 patients treated for mammary carcinoma or tumors within the chest are given. These show that when adequate technique is used fibrosis is rather rare. However, in inoperable cases, in which repetition of large doses is necessary, fibrosis cannot be avoided. The treatment of the intrathoracic changes produced by radiation is purely symptomatic. Reproductions of roentgenograms, illustrating the changes produced by intensive radiation are shown.—*Intrathoracic Changes Induced by Heavy Radiation, W. A. Evans and T. Leucutia, Am. J. Roentgenol. & Radium Therapy, March, 1925, xiii, 203.*—(*J. S. W.*)

Pleural Effusions in X-Ray.—Pleural effusions of moderate size most commonly manifest themselves by obliterating the costophrenic angle. The dense shadow has a cup-shaped or dome-shaped, irregular upper margin. In children the early effusion tends to rise upward in the axilla, and only later flattens out, before which the column of fluid casts a shadow as far mesially as the outer edge of the inner zone. Mediastinal structures are shifted to the opposite side in proportion to the bulk of the fluid. If adhesions are present the fluid becomes encapsulated, and appears as a globular mass. Tuberculous empyema tends to be sharply localized. In children rapidly developing purulent effusions complicating pneumonia appear at first hazy and then solid on the plate. Such effusions in adults are difficult to diagnose. Interlobar pleural effusions usually have well-defined upper and lower borders. These are at times obscured by a general effusion, and appear only after thoracentesis. "Lateral position in the prone" for examination is helpful. No change in the fluid level of empyema (uncomplicated by pneumothorax) occurs with change in position of the body. Differentiation between effusions and lung lesions is difficult. Displacement of the heart will occur with fluid in children, and usually in adults, and not with such conditions as pneumonia. In thickened pleura there is usually displacement of mediastinal structures *toward* the affected side. Consolidation of the lower portion of an upper lobe resembles an interlobar pleurisy, but usually in this case the upper margin of the density is hazy and not sharply set off from normal lung tissue as is the case with the pleurisy. This type of consolidation is also likely to be wedge-shaped, and usually begins at the periphery, but the shadow of the pleurisy is usually not so shaped and more commonly begins at the hilum. Lung abscess and encapsulated empyema at times cannot be differentiated by X-ray. Some of these latter have a pleuropulmonary fistula. Favoring diagnosis of abscess are air in the cavity, induration around the cavity and profuse foul expectoration. Air may be introduced into an encapsulated empyema by needling, and this may confuse the diagnosis.—*Pleural Effusions, General and Local: Their Detection and Differentiation by the X-Ray, W. H. Stewart, Radiology, March, 1925, iv, 209.*—(*H. S. W.*)

Anatomical Effects of Artificial Pneumothorax.—Six observations were made on cases of advanced tuberculosis, treated by artificial pneumothorax and dead of complications after six to fifteen months of treatment. The outstanding feature was a process of intense sclerosis surrounding the caseous masses. Cavities healed by fusing of the opposite walls were not seen. There

were always open cavities full of thick pus or caseous material. In one case some nodules had undergone calcification. On the other hand, pneumothorax did not always protect the atelectatic area from new advances. Its protective rôle exists nevertheless in most cases when the lung has been compressed for some time. Finally, there existed in these six cases lesions of recent date in the opposite lung even when death was due to other complications, as perforation of the lung, meningitis or cardiac failure.—*Conséquences anatomiques de la compression du poumon tuberculeux par le pneumothorax artificiel, Roubier, Meeting, Soc. Nationale de Médicine et des Sciences Médicales de Lyon, April 1, 1925, reported in Presse Méd., April 11, 1925, no. 29, 477.*—(*E. H. K.*)

Anatomical Effects of Artificial Pneumothorax.—A study was made of two lungs compressed by artificial pneumothorax for a year and a year and a half, respectively. Histological examination showed (1) an intense and diffuse sclerosis of elastic tissue; (2) formation of little bronchial cavities lined by cubital epithelium; (3) an intense pachypleuritis with probable partial hyaline degeneration of the pleural layer and partial amyloid degeneration of the fibrous tissue of the interior of the lung; and (4) the absence of giant cells and tuberculous follicles recently active. The question is raised as to whether venous congestion can have a part in the building up of this special sclerosis. In any case the compressed lung is dead functionally. It is maintained that the hyperproduction of fibrous tissue is no more capable of certain cure in a lung compressed by pneumothorax than in the spontaneous fibrous form of tuberculosis. In order that this healing may take place a transformation of the fundamental connective tissue appears indispensible.—*Étude anatomo-pathologique de deux poumons comprimes par un pneumothorax artificiel, Bonnamour and Doubron, Meeting, Soc. Nationale de Médicine et des Sciences Médicales de Lyon, April 1, 1925, reported in Presse Méd., April 11, 1925, no. 29, 473.*—(*E. H. K.*)

Pleurisy in Artificial Pneumothorax.—Recently Bernard and Baron have published a comprehensive article on this complication, which they observed in 60 per cent of artificial-pneumothorax cases. They described four types of pleurisy: (1) serous or fluid, (2) adhesive, (3) mixed, and (4) grave or septic; the last variety being quite uncommon. Pissavy adds to this the following conclusions from his own observation. *Serous or liquid pleurisies:* In this form there is little tendency to adhesions and, except in the case of very massive and dangerous collections of fluid, the rule of nonintervention is recommended. Thoracentesis may lead to such inconvenient and annoying features as infection of the chest-wall, with painful swellings. If the effusions are purulent, a permanent fistula may ensue. *Adhesive pleurisies:* Bernard and Baron here advocate puncture for the sake of introducing gas to maintain the pneumothorax. However, they present little evidence that this is effective, and it is possible that the repeated traumatisms may even favor the formation of adhesions. Hence, a policy of abstention is again recommended, as also in the mixed forms. *Grave pleurisies:* These occurred in 2.7 per cent of 254 cases observed. They may follow pulmonary perforation, and secondary infection is common, especially streptococcus and pneumococcus. Careful observations have conclusively shown the endogenous origin of these infections. It is from the lung that the pneumococci, streptococci, or anaerobes are derived. Every case of septic pleurisy followed by Pissavy has resulted fatally, no matter how treated.—*Les pleuresies du pneumothorax artificiel, A. Pissavy, Presse Méd., March 28, 1925, no. 25, 402.*—(*A. P.*)

Applied Pathology of Pulmonary Tuberculosis.—The reaction of the body to the tubercle bacillus and, in consequence, the pathological reaction, is markedly different in the animal or human body after first and after later infections. It is also greatly different in adults and children. In children the early lung lesion is a small circumscribed area of density connected to the hilum by a heavy trunk, and is shown on the X-ray plate. It is much more often in the middle or lower portions of the lung than at the apex. Marked densities are seen at the hilum, sometimes with discernible enlargement of the nodes. But other respiratory diseases of childhood produce hilum shadows that may be indistinguishable from those of tuberculosis unless caseation or calcification can be made out. "A caseocalcareous node" in the plate can frequently be made out. It has the density of calcium, and is usually quite large, and on section is found to have a soft caseous centre that contains larger hard flakes of calcium at the periphery. It never appears to be healed. Apical tuberculosis in adults resembles experimental tuberculosis in reinfected, immune animals, and this exudative reaction in adult lungs nearly always begins under the pleura as can be easily demonstrated in X-ray plates of the chest. The tendency of the septa is

to limit the spread of a tuberculous process, and this accounts for the fan-shaped areas of density that show in the chest plate. But the septa will also limit a lobular pneumonia and give similar X-ray signs. Densities in the plate from tuberculous lesions vary from less to greater as follows: (1) serous exudate; (2) cellular exudate; (3) fibrosis; (4) caseation; and (5) calcification.—*Applied Pathology of Pulmonary Tuberculosis, K. Dunham and J. H. Skavlem, Radiology, March, 1925, iv, 181.*—(*H. S. W.*)

Vital-Capacity Standards.—In spite of the large amount of recent work done on the many aspects of the subject of vital lung capacity, disagreement still exists as to the best choice of standards for predicting the normal capacity of a given individual. It has been established that the lung capacity varies with sex, age, weight, height, surface area, chest circumference, sitting height, previous occupation, state of health, and past history of certain diseases. But with so great a number of variables, the difficulty of obtaining enough constants to establish normal variations in lung capacity is apparent. The best opportunity of solving this difficulty appears to lie in observing a large number of persons in whom the variables can be carefully estimated. For this purpose a large group of college students was studied as regards the vital capacity. This was measured by means of a Sanborn water spirometer. Out of 3,534 male students of whom complete records were available, only 1,641 were considered normal after careful selection. A study of the vital capacity of this selected group using different standards resulted in the following conclusions: *1.* The commonly used standards for estimating vital capacity from surface area, height and weight practically coincide. *2.* The estimation based on chest circumference gives readings considerably too low, while that based on sitting height gives readings too high. *3.* When applied to this selected group all standards give readings too high for a normal distribution. *4.* Great care should be used in selecting normals for purposes of working out standards for the estimation of normal vital capacity.—*The Respiratory Organs in Health and Disease, XVI, A Comparison of Vital Capacity in Three Thousand Five Hundred Male University Students, W. P. Shepard and J. A. Myers, Arch. Int. Med., March 15, 1925, xxxv, 337.*—(*J. S. W.*)

Clinical Importance of Vital Capacity in Lung Conditions.—In an earlier study groups of cases with parenchymatous lung lesions showed reductions, decreasing on the average with the extent of disease revealed, and with the symptoms presented. In this study 773 cases were grouped, 338 presenting normal physical signs and an average capacity of 102.4 per cent of the theoretical normal. Most of these persons were between 18 and 40 years of age. In 47 cases in which diagnosis was reserved, the average vital capacity was 98.7 per cent. In 98 Minimal A tuberculosis cases the average was 90 per cent; in 32 Minimal B cases, 81.3 per cent; and in 6 Minimal C cases, 77.4 per cent of the theoretical normal. Moderately and far-advanced cases showed correspondingly greater decreases. The cases are also grouped according to roentgen-ray findings. In 112 showing no evidence of disease the average vital capacity was 104.1 per cent of normal. With chronic fibrous pleurisy (54 cases) it was 94.1 per cent, and with healed empyema 91 per cent. When extent of changes is considered, 203 confined to "above the first rib" showed an average of 98.7 per cent of normal. Of these, only 42 had clinical disease, and their average was 85.5 per cent. Thus, it is necessary to consider clinical as well as roentgen-ray findings in evaluating the test. Small areas of nonclinical disease have little or no effect on the vital capacity, whereas clinical tuberculosis practically always reduces it. Also, the fact that certain persons, by reason of special development or training, have unusually high normal vital capacities must be thought of, as well as that a few without apparent reasons have persistently low readings. Thus, the routine recording of the vital capacities of persons in good health assumes greater importance.—*The Respiratory Organs in Health and Disease, xviii, The Vital Capacity of the Lungs in Chronic Fibrous Pleurisy, Healed Empyema and Pulmonary Tuberculosis, Both Clinical and Nonclinical, J. A. Myers and C. H. Rice, Arch. Int. Med., May 15, 1925, xxxv, 557.*—(*A. P.*)

Vital Capacity of Minneapolis Firemen.—This study covered 419 firemen of whom 345 were regulars in the department, and 74 substitutes. It was desired to correlate their vital capacities with their standing heights, body weights, sitting heights, and ages, and to determine the normal degree of variation with each of these. The averages in each instance were determined, and then weighted by multiplying the mean by the number of cases. The percentage deviants were also weighted in the same way, and the weighted deviants averaged by adding together and dividing by the total number of cases. The per-

centage increments at regular intervals were determined, as well as the absolute increment. *Vital capacity and standing height:* Vital capacity increases at a steady rate as body length increases, although there is a range of variability from one-eighth to one-sixth of the calculated values on each side of the central curve. The weighted average percentage deviant is 2.33 per cent, this indicating a closer correlation than exists with any other body measurement. The percentage increment per inch is, however, greater for the shorter body lengths. The percentage deviations of the observed from the calculated averages were over 10 per cent in a very few cases. *Vital capacity and sitting height:* The weighted average percentage deviant was here 2.53 per cent, a correlation not quite so close as with standing height. *Vital capacity and age:* The vital capacity decreases steadily with age from maturity on, and may be expressed empirically as follows: V. C. (cc.) = 5725 — 34.46 times age (years); there is about 172 cc. decrease every five years. At least two factors influence the vital capacity in relation to age: (1) the growth of the lungs, and (2) the loss in elasticity of the alveolar walls. *Vital capacity and body weight:* There is a very slight rise in vital capacity with increasing weight, although so small that it falls within the margin of error. Increase in body weight after the age of 21 is largely due to subcutaneous and visceral fat deposits, the lungs not increasing further in size, although of course there is a tendency for the body weight to be greater in those whose height is longer. The average increase in vital capacity is 4.6 cc. for every 10 pounds of body weight. *Comparison with standards:* Curves prepared on the basis of surface area and Dreyer's formula nearly coincide. The observed vital capacities are well within normal limits by both until after the age of 40 years. When the standing height standard was used they remained practically within normal limits up to 60 years.—*The Vital Capacity of the Lungs of Firemen, J. A. Myers and L. M. A. Maeder, Arch. Int. Med., February 15, 1925, xxxv, 184.*—(*A. P.*)

Classification of Tubercle Bacilli.—In tuberculosis of man and animals three types of tubercle bacilli are recognized. These are designated human, bovine and avian from the hosts in which they generally occur, and are distinguished one from another by their mode of growth on glycerine media and by their virulence for certain species of animals. The work of determining these differential characters requires both time and experience, and a supply of carefully prepared special media, and accommodation for rabbits and guinea pigs. These considerations raised the question whether it might not be possible to distinguish types by the employment of serological tests. Agglutination and agglutinin absorption experiments were done on a number of different strains. The agglutinating serum was obtained from rabbits treated with increasing doses of culture killed by heating at 65°C. The suspensions for the agglutination tests were made in the usual manner, except that they were carefully ground up between sterile ground-glass plates instead of in an agate mortar. All suspensions were heated at 65°C. for one-half hour and preserved with 0.3 per cent phenol. For the agglutination tests the usual macroscopic method was employed throughout. For the absorption tests, the growths used were taken mainly from potato and agar, and were not killed by heat. For complete absorption of a tubercle serum a relatively large dose of bacilli is required, and the dilution used for absorption varies with the titre of the serum. Many strains of tubercle bacilli were tested by these methods. Simple agglutination tests did not divide the strains into groups. The majority of the strains, whether human, bovine or avian, agglutinated with each type of serum at full or half titre. In the agglutinin absorption tests it was found that the mammalian strains absorbed agglutinin completely from both human and bovine serum, whereas with avian strains only exceptionally has the absorption been nearly complete. On the other hand, avian strains always removed all the agglutinin from avian tubercle sera. The evidence on the whole, therefore, indicates that mammalian tubercle bacilli possess an antigen which is not represented in avian tubercle bacilli. These results show that serological tests divide the tubercle bacilli into two groups; a mammalian group, including all strains of human and bovine type, and an avian group. For practical purposes, therefore, serological tests are of no value in the differentiation of human from bovine tubercle bacilli, but they add to our means of distinguishing the common avian tubercle bacillus from mammalian strains. An unknown strain which absorbed completely the agglutinin from an avian serum would be entitled to be classed as of avian type. Two strains received from the National Collection were especially studied according to these criteria, and, in addition, their cultural characteristics, morphology and pathogenicity are reported in detail. Although believed to be of human and bovine origin respectively, both were found to be avian strains, the virulence of

which for the fowl had been lost during long artificial cultivation.—*The Serological Classification of Mammalian and Avian Tubercle Bacilli, A. S. Griffith, Tubercle, June, 1925, vi, 417.*—(*J. S. W.*)

Isolation of Tubercle Bacilli.—The author has tried various methods for the isolation of tubercle bacilli, and concludes that his own method, in which he uses sulphuric or hydrochloric acid, for destroying the rapidly growing contaminators is superior to the antiformin methods.—*On the Isolation Method of Tubercle Bacillus, Y. Sumiyoshi, Kekkaku, 1925, vol. iii, no. 1, Abstract from Japan Medical World, 1925, v, 227.*—(*M. M.*)

New Method for Isolating Tubercle Bacilli.—Tubercle bacilli are highly resistant to mineral and organic acids, as well as to strong alkalis, antiformin, etc. Various acids, sulphuric, hydrochloric, acetic and lactic, and lye were used in the experiment. Of these, sulphuric and hydrochloric acids gave decidedly the best results. In this method 40 per cent sulphuric or hydrochloric acid is added to five times as much sputum, and cultures are made on glycerine potato. The time of treatment is not given. With an acid concentration up to 25 per cent, bacilli are always viable while all other bacteria are dead; above 40 per cent strength of acid, the tubercle bacilli also are killed and cultures are always sterile. The method is also applicable to study of the urine. Of 14 studies of urinary sediment, with which animals were also inoculated, three animals failed to develop tuberculosis, but cultures were positive. Whether these were pathogenic is not evident. The method is applicable also to pus from otitis media and other infections. This study shows that in 6 of 15 cases of this disease tubercle bacilli were found and the pus-forming cocci were regarded as saprophytic.—*Beitrag zur Leistungsfähigkeit der direkten Zuchtung die Tuberkelbazillen aus dem infektiösen Material, mit einem Beitrag zur Geflügeltuberkulose in Menschen, E. Löwenstein, Wien. klin. Wchnschr., March 6, 1924, xxxvii, 231.*—(*H. S. W.*)

Isolation of Tubercle Bacilli by Petroff's Method.—A number of methods for the isolation of tubercle bacilli were studied, and of these Petroff's method was found to be the most satisfactory and easiest of performance.—*On the Isolation of Tubercle Bacillus by Petroff's Method, S. Nozao, Nihon Biseibutsugakkwai Zasshi, 1924, xviii, no. 3, Abstract from Japan Medical World, 1924, iv, 297.*—(*M. M.*)

Resistance of Acid-Fast Bacteria to Antiformin.—There is no absolute resistance of the acid-fast bacteria to antiformin. There is such a resistance for warm-blooded tubercle bacilli from animals and for passage strains, but not for saprophytic cultures and the closely related turtle tubercle bacillus of Friedmann, which requires a longer time for its dissolution than do other non-acid-fast bacteria. Even a short period of residence of the saprophytic acid-fast strains in the peritoneal cavity of guinea pigs increases their resistance to antiformin.—*Untersuchungen über die Antiforminfestigkeit der säurefesten Bakterien, K. Nakamura, Ztschr. f. Hyg., 1924, cii, 408.*—(*H. J. C.*)

Influence of Hydrogen-Ion Concentration of the Media on Growth of Acid-Fast Bacteria.—The range of growth of saprophytic acid-fast bacilli and the reaction changes produced in glycerol-bouillon were compared with that of warm and cold-blooded tubercle bacilli. Pure saprophytic strains grew well in strongly alkaline as well as strongly acid media, while the genuine warm-blooded tubercle bacilli had narrower ranges of growth. The reaction changes occurring in glycerol-bouillon during growth were dependent on the hydrogen-ion concentration of the medium at the time of inoculation and upon the individual strain. The reaction also influenced markedly the inhibitory action of chemical substances.—*Über den Einfluss der Wasserstoffionenkonzentration des Nährbodens auf das Wachstum der säurefesten Bakterien, K. Ishimori, Ztschr. f. Hyg., 1924, cii, 329.*—(*H. J. C.*)

Tubercle Bacilli in Bone-Marrow.—Is death from tuberculosis associated with tubercle-bacillus sepsis? Such a contention has been made. Tubercle bacilli were isolated from the gall-bladder in 46 per cent of 62 persons dead from tuberculosis (miliary, 8 cases). Cases in which the liver was grossly free from tubercle, showed a high percentage of bacilli in the bile, and in these livers on serial section microscopic tubercles were usually found (11 out of 12). The bone-marrow in these cases was also examined for bacilli by animal or culture-tube inoculation, and bacilli were present in a large percentage of cases. This finding is important, especially as our methods of recovering bacilli from fresh material is relatively crude at best. They were present in the bone marrow in 75 per cent of 25 cases.—*Ueber Tuberkelbacillen-Befunde im Knochenmark Tuberkuloser, T. Koizumi, Deutsche med. Wchnschr., October 31, 1924, li, 1506.*—(*H. S. W.*)

Egg-Yolk Medium for Tubercle Bacilli.—There are two objections to the use of egg-yolk for medium. These are turbidity and the likeness of the color of the medium to that of the bacilli. These may be obviated if one sterilizes the yolk fluid that has been previously cleared by the addition of alkali and neutralizes with acid. The yolks of two eggs are added to neutral distilled water *q. s.* 300 cc. Nine to 12 cc. of 1/4 N sodium hydroxide are added to visible clearing, and distilled water is again added to 700 cc., which means a 5 per cent egg-yolk solution. The solution is then filtered through glass-wool, bottled or tubed, and sterilized, after which it is nearly neutralized by the addition of 12 N hydrochlorid acid.—*Eigelbwasser zur Züchtung von Tuberkelbazillen, K. Weise, Deutsche med. Wchnschr., February 13, 1925, li, 270.*—(*H. S. W.*)

Mechanism of Absorption of Tubercle Bacilli in Intestinal Tract.—Rabbits were fed both carmine and tubercle bacilli, which were found to be absorbed in the intestinal wall only through the lymph follicles, corroborating the previous work by Kumagaya with india ink. Older rabbits absorbed the carmine and tubercle bacilli less readily than did the young ones.—*On the Mechanism of Absorption of Tubercle Bacilli in the Intestinal Tract, or on Intestinal Infection of Tuberculosis, K. Kumagaya, and S. Ishiguro, Kekkaku, 1925, vol. iii, no. 1, Abstract from Japan Medical World, 1925, v, 227.*—(*M. M.*)

Yabe's Modified Strain of Tubercle Bacilli.—The strain of tubercle bacilli "T. Y.," isolated by the late Surgeon-General Yabe, I. J. N., was studied. The tubercle bacilli were isolated and cultivated in a medium containing saponin from the fruit of a plant (*Sapindus mukurosi Gaerthn*). The strain lacks acid-fastness and has branching forms. It has a certain pathogenicity and toxicity for animals, but the pathological features of the disease are quite different from that produced by ordinary tubercle bacilli. Immunological, bacteriological and cultural studies were made of the microörganism. A reversion to the original genuine tubercle bacillus was also attained.—*Studies on Yabe's Strain of Tuberculosis "T. Y.," together with Its Biological Nature, T. Yabe, M. Shibata, Y. Kumagaya and K. Kobayashi, Kekkaku, 1924, xiii, no. 6, Abstract from Japan Medical World, 1925, v, 162.*—(*M. M.*)

Symbiosis of Tubercle Bacillus and Man.—Although bacteria are the exciters of disease, they are not truly the cause. Only a few, including the anthrax bacillus, the gas bacillus and the tetanus bacillus, are pathogenic under all conditions. The human race is tuberculized, and those peoples who have been longest in contact with tuberculosis are most resistant to it. Host and parasite have reached a state of symbiosis. Far too much weight to-day is placed on the rôle of the tubercle bacillus, and too little on the hereditary factors, which are responsible for the development of the disease.—*Hat der Tuberkelbazillus eine Lebensgemeinschaft mit dem Menschen? Rheins, München. med. Wchnschr., June 5, 1925, lxxii, 941.*—(*E. R. L.*)

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